



A Del Power Conversion Group Company \* 800-966-2776 \* info@bertan.com

## *Series 210*

**Up To 225 Watt Regulated DC Output High Voltage  
Power Supplies for Laboratory or Systems Applications**



- Up To 100 kV Output
- Reversible Polarity Models
- Short Circuit and Arc Protected
- Custom and OEM Designs
- Remote Analog Programming
- Low Ripple and Noise
- IEEE-488 Interface Available
- Remote Monitoring
- CE Certified

## *General*

The Series 210 is a family of precision regulated linear power supplies with output voltages up to 100kV. The units are fully enclosed and can be operated as bench top instruments or mounted into a 19" rack. These stable, low noise high voltage power supplies feature reversible polarity, remote analog programming and monitoring, front panel voltage and current metering, and calibrated direct reading front panel voltage controls. All units have arc and short circuit protection for safe, reliable operation.

The output high voltage of the Series 210 can be remotely programmed or controlled via the precision front panel direct reading controls. All models can be adjusted over their full output voltage range using an analog programming 0 to -5V signal or using an external potentiometer. Units may also be ordered with remote digital 16 bit binary programming (option CBNY). This option accepts TTL compatible programming inputs applied at a rear panel digital programming connector.

Remote analog monitoring of the high voltage output is standard on all Series 210 power supplies. Signals proportional to the output voltage and output current are provided at the rear panel I/O connector. A logic output signal indicating high voltage polarity is also standard.

Full talker/listener capability for the Series 210 is available through an intelligent IEEE-488 interface which is offered as an accessory. This interface (the Model 200-C488) allows a GPIB controller to program and monitor a Series 210 high voltage power supply. In addition to duplicating front panel operation, the 200-C488 provides the user with a number of additional functions such as programmable overload detection and response.

## Output

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### Voltage and Current:

See chart below

### Polarity:

For 1kV through 5kV models polarity reversal is achieved by a screwdriver type switch located on the rear panel of the unit.

For 10kV through 50kV models polarity reversal is achieved by the reversal of an internal connector. The selected polarity is displayed on a front panel LED indicator.

75 and 100kV models are fixed polarity, either positive or negative and must be ordered with the appropriate suffix, P or N.

| MODEL      | VOLTAGE    | CURRENT    | RIPPLE<br>(pk-pk) |
|------------|------------|------------|-------------------|
| 210-01R    | 0 to 1kV   | 0 to 225mA | 50mV              |
| 210-01.5R  | 0 to 1.5kV | 0 to 130mA | 100mV             |
| 210-02R    | 0 to 2kV   | 0 to 100mA | 100mV             |
| 210-03R    | 0 to 3kV   | 0 to 75mA  | 100mV             |
| 210-05R    | 0 to 5kV   | 0 to 40mA  | 200mV             |
| 210-10R    | 0 to 10kV  | 0 to 15mA  | 500mV             |
| 210-20R    | 0 to 20kV  | 0 to 7mA   | 1V                |
| 210-30R    | 0 to 30kV  | 0 to 4.5mA | 1.5V              |
| 210-50R    | 0 to 50kV  | 0 to 2.5mA | 5V                |
| 210-75P,N  | 0 to 75kV  | 0 to 2mA   | 5V                |
| 210-100P,N | 0 to 100kV | 0 to 1mA   | 20V               |

The 75kV and 100kV models are fixed polarity and must be ordered as suffix P or suffix N denoting positive or negative polarity high voltage output. All other units have reversible polarity. Ripple is measured peak to peak at maximum output.

## Input

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### Power:

115 Vac  $\pm 10\%$  @ 5 Amperes (6.25A for models up to 5kV), 50-60 Hz.

230 Vac  $\pm 10\%$  @ 3.0 Amperes, 50-60Hz.

## Performance

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### Line Regulation:

$\pm 0.001\%$  of maximum for  $+10\%$  input line change.

**Load Regulation:**

$\pm 0.005\%$  of maximum for 0 to maximum output current change.

**Ripple:**

See chart above

**Temperature Coefficient (0 to 50°C):**

50ppm of maximum per °C.

**Stability (after ½ hr warm-up):**

0.01% per hour; 0.02% per 8 hours.

**Features**

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**Front Panel Meter:**

Front panel analog meter, switch selectable for reading output voltage and current. The meter accuracy is  $\pm 2\%$  of full scale.

**Front Panel Controls:**

Calibrated front panel direct reading multi-turn precision potentiometer and switches. Accuracy is  $\pm(0.25\%$  of setting + 0.05% of maximum) for models up to and including 30kV;  $\pm(0.5\%$  of setting + 0.05% of maximum) for 50kV, 75kV and 100kV models.

**Resolution:**

0.2V for models up to and including 30kV; 20V for 50kV, 75kV and 100kV models.

**Remote Programming:**

0 to -5 Volt dc analog input signal proportional to 0 to maximum rated output. Accuracy is  $\pm(0.25\%$  of setting + 0.05% of maximum) for models up to and including 30kV;  $\pm(0.5\%$  of setting + 0.05% of maximum) for 50kV, 75kV and 100kV models. The programming input impedance is 5 kilohms.

**Analog Output Voltage Monitor:**

0 to +5 Volts proportional to 0 to maximum output high voltage. Accuracy is  $\pm(0.25\%$  of reading + 0.25% of maximum). The monitor output impedance is 50 kilohms.

**Analog Output Current Monitor:**

0 to +5 Volts proportional to 0 to maximum output current, except as indicated. Accuracy is  $\pm(0.5\%$  of reading + 0.25% of maximum). The monitor output impedance is 50 kilohms.

**Current Limit:**

Automatic current limiting occurs at approximately 110% of maximum rated output current at the maximum rated output voltage. The allowable maximum output current at any set voltage must be derated linearly from 100% at maximum voltage output down to 30% of maximum output current at 0 output voltage. Supply is self-restoring upon removal of cause of current limit condition.

**Protection:**

Arc and short circuit, self restoring.

**Mechanical**

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**Size:**

All units are 19 inch (483mm) wide standard rack mount and 5¼ inches (133mm) high. Models up through 5kV are 11 inches (279mm) deep. All units above 5kV are 16 inches (406mm) deep.

**Weight:**

See chart below

**High Voltage Connector:**

See chart below

Note: Except where noted below, preassembled HV cable must be purchased separately.

| MODEL      | OUTPUT | MATING | lbs (kg) |
|------------|--------|--------|----------|
| 210-01R    | JAC    | PAE    | 34 (15)  |
| 210-01.5R  | JAC    | PAE    | 34 (15)  |
| 210-02R    | JAC    | PAE    | 34 (15)  |
| 210-03R    | JAC    | PAE    | 34 (15)  |
| 210-05R    | JAC    | PAE    | 34 (15)  |
| 210-10R    | JJA    | 405787 | 34 (15)  |
| 210-20R    | JJA    | 405787 | 37 (17)  |
| 210-30R    | JJA    | 405787 | 39 (18)  |
| 210-50R    | JJB    | 405787 | 46 (21)  |
| 210-75P,N  | 206907 | 206906 | 50 (23)  |
| 210-100P,N | 206907 | 206906 | 50 (23)  |

The mating high voltage connector is provided with each unit. For 75kV and 100kV models the mating connector, assembled to 3 meters of high voltage shielded cable, is provided. Note: BERTAN P/N PAE is equivalent to Kings SHV type 1705-14.

**Power Input Connector:**

A captive 3-wire line cord and NEMA plug is included.

**Low Voltage 1/0 Connector:**

The PROGRAMMING/MONITOR connector P/N JKB provides all remote control and monitor functions. The mating connector P/N PKB is provided.

**Cooling:**

Internal fan.

**Accessories****Model 200-C488, IEEE-488 Interface:**

Full talker/listener capability for the Series 210 is available through a separate 19" rack-mountable intelligent IEEE-488 interface. The interface functions with all Series 210 power supplies and allows output voltage, voltage limit and current limit to be remotely programmed via the IEEE-488 bus. In addition, voltage and current measurements can be taken on request and the supply can be programmed to shut down on a voltage and/or current overload condition. For additional details see the data sheet for **Series C488**.

## ***Options***

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### **Option CBNY, Digital Programming Interface:**

All units in the 210 Series can be provided with a factory-installed option for remote, 16 bit binary, TTL compatible, digital programming of the high voltage output. Installation of this option does not defeat any of the standard features. Selection of front panel or remote analog programming is still available.

The addition of this option allows the power supply to be easily interfaced to any computer or microprocessor. User selectable modes of operation include 8 bit data bus input, 16 bit data bus input, latching and non-latching control. See option CBNY product information sheet in this catalog for further details.

### **Suffix "F", Floating Output:**

Available for 1kV through 5kV models. Differential high voltage output via two isolated (+) and (-) high voltage connectors. Either the (+) or (-) output can be returned to chassis ground or isolated from chassis ground by up to  $\pm 2000\text{Vdc}$ .

### **Output Connector for "F" Option:**

BERTAN P/N JDK (Kings UG-931/U) for 1kV through 3kV supplies. Mating Connector, BERTAN P/N PDB (Kings UG-932/U) is supplied. For 5kV supply, output connector is BERTAN P/N JBA (Kings 1064-1). Mating connector BERTAN P/N PBA (Kings P/N 1065-1) is supplied.

Output voltage monitoring and programming remains referenced to chassis ground. Front panel current metering and remote monitoring is omitted.

### **Suffix "RF", Reversible Polarity/Floating Output:**

Available for 10kV through 50kV models. High voltage output is referenced to an isolated common return binding post. The isolated return can float up to  $\pm 100\text{V}$  from chassis ground. Voltage and current monitoring, as well as voltage programming is referenced to the isolated return binding post.

### **Suffix "PF", Positive Polarity/Floating:**

Available for 75kV and 100kV models. High voltage output is referenced to an isolated common return binding post. The isolated return can float up to  $\pm 100\text{Vdc}$  above chassis ground. Voltage and current monitoring, as well as voltage programming is referenced to the isolated return binding post.

### **Suffix "NF", Negative Polarity/Floating Output:**

Available for 75kV and 100kV models. High voltage output is referenced to an isolated common return binding post. The isolated return can float up to  $\pm 100\text{Vdc}$  above chassis ground. Voltage and current monitoring, as well as voltage programming, is referenced to the isolated return binding post.

## ***Custom Models***

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The Series 210 can be economically and quickly modified to satisfy custom applications. Other output voltage and/or current ratings, custom control features, digital programming, or special mechanical constraints are some of the varied requirements which can be satisfied. Contact **[sales@bertan.com](mailto:sales@bertan.com)** for a responsive review of your application.